

Proposed Virginia Stormwater Management Regulations: Water Quality Criteria & Compliance

Virginia Soil & Water
Conservation Board
September 24, 2008



David J. Hirschman,
Program Director for
Stormwater

Center for Watershed
Protection

CENTER FOR
WATERSHED
PROTECTION



CWP Role

Scientific Foundation & Regulatory Tools

- Update Stormwater Quality & BMP Research
- Develop Stormwater Quality Approach
 - Methods & Computations
 - Structural & Site Design BMPs
 - Assistance with BMP Specifications
- Assist with ASCE/DCR Charettes

A New Stormwater Approach: Major Themes

1. Site Load Standard – 0.28 pounds/acre/year for Total Phosphorus
2. More options for stormwater practices and overall site design
3. Treating impervious cover + managed turf to better control nutrients
4. Stormwater BMP planning & compliance spreadsheet
5. DCR/ASCE design charettes

1. Site Load Standard

- What we do now

- Total phosphorus (TP) as keystone
- Most sites meet average land cover condition (0.45 lbs/acre/year)
- Doesn't apply to much of state

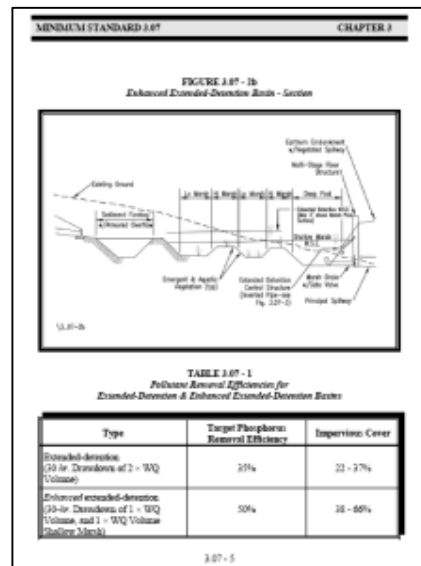
- What is proposed

- TP basis for compliance; Total Nitrogen also calculated
- Load limit tied to Tributary Strategy goals = 0.28 lbs/acre/year (TP)
- State-wide application

2. Stormwater BMP Choices

- What we do now

- BMP options from Regulations & Blue Book



- What is proposed

- Site design & conventional BMPs in Handbook & Clearinghouse, supported by spreadsheet
- BMP performance =
Runoff reduction +
Pollutant removal
- Use of “treatment train”

Ponds & Basins



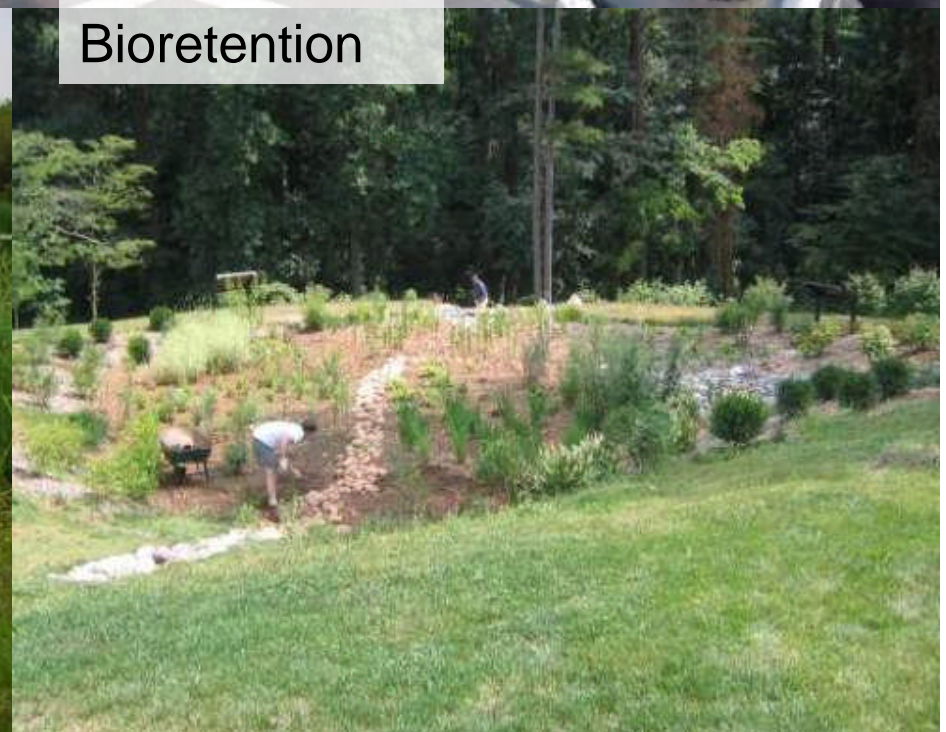
Underground Treatment Devices



Stormwater Wetlands



Bioretention



Rainwater Harvesting



Green Roof



Sheetflow to Open Space



Pervious Parking

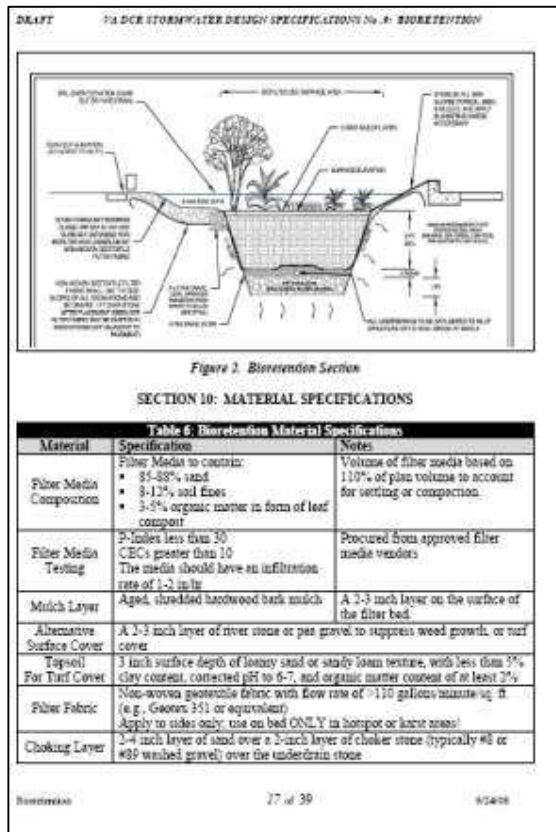


Runoff Reduction (RR)

Runoff reduction is defined as the total volume reduced through canopy interception, soil infiltration, evaporation, rainfall harvesting, engineered infiltration, extended filtration or evapotranspiration at small sites



BMPs: Level 1 & 2 BMP Designs



- Level 1: good, standard design
- Level 2: enhanced design to boost nutrient removal

Table 1: Summary of Stormwater Functions Provided by Bioretention Areas		
Stormwater Function	Level 1 Design	Level 2 Design
Annual Runoff Reduction	40%	80%
Phosphorus Removal ¹	25%	50%
Nitrogen Removal ¹	40%	60%
Channel Protection	Moderate. RRv can be subtracted from CPv	
Flood Mitigation	Partial. Reduced Curve Numbers and Time of Concentration	

¹ Change in event mean concentration (EMC) through the practice. Actual nutrient mass load removed is the product of the removal rate and the runoff reduction rate and will be higher than these percentages, as calculated using the Runoff Reduction Spreadsheet Methodology. Sources: CSN (2008) and CWP (2007).

3. Treating Impervious Cover & Managed Turf Areas

- What we do now

- Nutrient loads based on impervious cover



- What is proposed

- Nutrient loads & treatment volume based on impervious cover + managed turf
- Incentives to preserve forest cover



4. Spreadsheet Compliance Tool

- What we do now

- Variable between localities – most use Blue Book method

- What is proposed

- Somewhat uniform use of spreadsheet tool

Water Quality Compliance Spreadsheet

1. Post-Development Project & Land Cover Information

Constants					
Annual Rainfall (inches)	43				
Target Rainfall Event (inches)	1.00				
Phosphorus EMC (mg/L)	0.28				
Target Phosphorus Load (lb/acre/yr)	0.28				
Pj	0.90				
Land Cover (acres)					
	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space -- undisturbed, protected forest/open space or	0.0	2.0	4.0		6.0
Managed Turf -- disturbed, graded for yards or other turf to be		6.0	14.0		20.0
Impervious Cover (all soil types)	14.0				14.0
				Total	40.0
Rv Coefficients					
	A soils	B Soils	C Soils		
Forest/Open Space	0.02	0.03	0.05		
Managed Turf	0.15	0.20	0.05		
Impervious Cover			0.95		

Channel Protection	
Allowable $Q_{Developed} = Q_{Forested} \times V_{forested} / V_{Developed}$	
Target Rainfall Event (in)	2.60
Runoff Reduction Volume (cf)	19,116.22
Drainage Area A	
Drainage Area (acres)	19.00
Runoff Reduction Volume (cf)	12,657.08
Drainage Area B	
Drainage Area (acres)	18.00
Runoff Reduction Volume (cf)	6,459.13

5. ASCE/DCR Design Charettes

- Five “round 1” workshops
- Addressed comments/suggestions
- Two “round 2” workshops
- Over 300 participants
 - Design consultants
 - Local gov’t
 - State & Federal government
 - Environmental
 - Academic
 - Vendors



Take Home Points

- Method supported by better science; incorporates runoff reduction
- Broader menu of available BMPs
- Incentives for site design that protects water quality -- preserve/restore forest & reduce disturbed soils
- Targeted to water quality goals